

ECE736  
Questions for Joseph Wang

**Assignment for 3/17 class:**

- 1) What is your biggest concern about SRAM beyond 32/28nm and what type of design improvements would be most needed?
- 2) What are the most challenging SRAM design problems facing the next generation?
- 3) What do you consider to be your most important metrics for SRAM (standby leakage, yield, etc. )?
- 4) What design methods will be employed by industry to address the increasing variability with scaling?
- 5) What SRAM circuit design techniques will be used to enable high yield beyond 32nm?
- 6) What additional circuit innovations are needed beyond 32nm?
- 7) What are the most promising assist features or the ones you see most likely to be implemented?
- 8) When will assist features become essential for 6T SRAM?
- 9) What are your expectations on voltage and Tox scaling at 32/28nm and 22/20nm nodes?
- 10) How far do you think will planar 6T SRAM will extend beyond 32nm?
- 11) What do you see as the most promising technology alternatives? (FINFET, MG/HK etc.)
- 12) What are the most promising alternatives to 6T SRAM cell options? (5T, 7T, 8T, 9T, 10T etc.) and why?
- 13) What type of sense amp do you prefer and why?
- 14) Which SA type do you think are most extendable?
- 15) What is the typical SRAM bit count at 40nm and 28nm nodes for the cell phone products?
- 16) What is the ratio of 1 port to dual port SRAM on the product mix at 40nm and 28nm?
- 17) How do you address NBTI and reliability mechanisms?
- 18) What types of SRAM applications are concerned with SER and what types are not?
- 19) What reliability mechanisms are of most concern as we scale and what circuit methods are employed to address these concerns?
- 20) What is your expectation on the long term outlook for our industry?